

**UNITED STATES DEPARTMENT OF ENERGY
PORTSMOUTH GASEOUS DIFFUSION PLANT**

**RADIOLOGICAL NATIONAL EMISSIONS STANDARDS
FOR HAZARDOUS AIR POLLUTANTS (NESHAP)**

ANNUAL REPORT

(40 CFR 61.94 , SUBPART H)

1996

SECTION I. FACILITY INFORMATION

SITE DESCRIPTION

The Portsmouth Gaseous Diffusion Plant (PORTS) is owned by the Department of Energy (DOE). PORTS was operated by DOE and managed by Martin Marietta Energy Systems, Inc. until July 1, 1993. In 1992 Congress passed legislation amending the Atomic Energy Act of 1954 to create the United States Enrichment Corporation (USEC), a government corporation similar to the Tennessee Valley Authority, to operate the uranium enrichment enterprise in the United States. The new corporation began operation on July 1, 1993. In accordance with the Act, USEC leased all production facilities at PORTS and its sister plant at Paducah, Kentucky, from DOE. This report covers only the DOE operations at PORTS.

DOE activities at the PORTS site include waste management, environmental restoration, removal of highly enriched uranium (HEU), environmental monitoring, and operation of nonleased facilities. Environmental monitoring consists of two major activities: effluent monitoring and environmental surveillance. Effluent monitoring is direct measurement or the collection and analysis of samples of liquid and gaseous discharges to the environment. Environmental surveillance is direct measurement or the collection and analysis of samples of air, water, and soil. Environmental monitoring is performed to characterize and quantify contaminants, assess radiation exposures of members of the public, demonstrate compliance with applicable standards and permit requirements, and detect and assess the effects (if any) of DOE activities on the local environment. Multiple samples are collected throughout the year and are analyzed for radioactivity, chemical content, and various physical attributes.

The PORTS site is located in sparsely populated, rural Pike County, Ohio, on a 16.2-km² (6.3-mile²) site about 1.6 km (1 mile) east of the Scioto River Valley at an elevation of approximately 36.6 m (120 ft) above the Scioto River floodplain. The terrain surrounding the plant, except for the Scioto River floodplain, consists of marginal farmland and densely forested hills. The Scioto River floodplain is farmed extensively, particularly with grain crops.

Pike County has a generally moderate climate. Winters in Pike County are moderately cold, and summers are moderately warm and humid. The precipitation is usually well distributed with fall being the driest season. Prevailing winds at the site are out of the southwest to south. Average wind speeds are about 5 mph (8 km/h) although winds of up to 75 mph (120 km/h) have been recorded at the plantsite. Usually, high winds are associated with thunderstorms that occur in spring and summer. Southern Ohio is within the midwestern tornado belt although no tornados have struck the plantsite to date.

Pike County has approximately 23,000 residents. Scattered rural development is typical; however, the county contains numerous small villages such as Piketon, Wakefield, and Jasper, which lie within a few kilometers of the plant. The county's largest community, Waverly, is about 19 km (12 miles) north of the plantsite and has a population of approximately 5,100 residents. Additional population centers within 80 km (50 miles) of the plant are Portsmouth (population 25,500), Chillicothe (population 23,420), and Jackson (population 6,675). The total population of the area lying within an 80-km (50 mile) radius of the plant is approximately 600,000.

Specifically from a radiological perspective, DOE is responsible for the decontamination activities in the X-326 building, X-326 mixed RCRA waste storage area and its glovebox, X-345 high assay sampling area (HASA) and glovebox, and X-744G glovebox. DOE no longer contributes to emissions from the X-326 Top Purge/Side Purge/E-jet vents, Seal Exhaust (SE) 6 and SE 5.

X-326 Shutdown

In 1991, the decision was made to suspend production of highly enriched uranium (HEU) and very highly enriched uranium (VHE) and to shut down the portion of the diffusion cascade that produces the higher assay materials. The initial work on the X-326 shutdown project began in mid-1992 when the main enrichment cascade was reconfigured to bypass the section that produced the HEU. In the last quarter of 1992, DOE began to remove accumulated uranium deposits from the equipment that had been taken out of service. These cleanup activities continued through 1995. Since all work associated with the shutdown and cleanup process have been completed, DOE no longer has any radiological emissions being emitted from these activities.

SOURCE DESCRIPTION

Monitored Sources

X-345 High Assay Sampling Area (HASA)

The X-345 HASA, operated by DOE, is an automated sampling and transfer system for UF_6 enriched to a high ^{235}U assay. To avoid cross contamination between samples and trace releases when disconnecting sample containers, the sampling manifold is purged and evacuated by a vacuum pump and air jet educator in series through a bank of cold traps followed by a bank of chemical adsorbent traps. In the event of a trace release occurring in spite of the purge and evacuate procedure, a "gulper" is mounted behind the manifold connections. The gulper is simply a continuous vacuum nozzle, similar in principal to a lab hood, to pull any small releases out of the room air into the chemical adsorbent traps.

The X-345 HASA was placed in an operational stand-by mode in late 1995 after notifying USEPA Region V. Since that time, the X-345 HASA has not operated and, as a result, did not have any radioactive emissions for 1996. The system is equipped with "**Do Not Operate**" tags and is physically locked out of operation according to PORTS Lockout/Tagout Policies.

Table 1.0 DOE PORTS Continuously Monitored Emission Point

Location	Stack & Vent Identification
X-345 High Assay Storage Area (HASA)	X-345-A-1297

Unmonitored Sources

DOE PORTS has three unmonitored minor sources. Based on process knowledge and ambient monitoring data, none of these sources are believed to contribute significantly to plant radionuclide emissions under normal operations.

Gloveboxes

Once produced, uranium oxide powder is handled as needed in one of three gloveboxes. The gloveboxes have airlocks for the entry and removal of work materials and are maintained under negative pressure during use. This negative pressure is produced by an exhaust fan drawing through a HEPA filter. Since 1978, uranium oxide is no longer reprocessed into UF_6 at PORTS and consequently the gloveboxes see little or no usage and generate no emissions. DOE is responsible for the operation of the gloveboxes in the X-326 mixed RCRA waste storage area, the X-345 facility and the X-744G facility.

SECTION II. RADIONUCLIDE EMISSIONS

Radionuclide Emissions from Monitored Sources During CY 1996

The X-345 HASA is the only DOE monitored source for 1996. Because the source did not operate in 1996, there were no radiological emissions (i.e., 0 curies) from this source.

Radionuclide Emissions from Unmonitored Sources During CY 1996

The X-326 mixed RCRA waste storage area glovebox, and X-345 the glovebox/fume hood did not have any radiological emissions as a result of their limited operation in 1996. The X-744G glovebox had a release of 0.000000002 curies for 1996.

There were no unplanned releases during 1996.

Table 2.0 Curies Released During CY 1996

Nuclide	X-326 Glovebox	X-345 Glovebox	X-345 HASA	X-744G Glovebox	Total
Total Uranium	0	0	0	0.000000002	0.000000002

Radionuclide Emissions from Fugitive and Diffuse Sources During CY 1996

There were no significant emissions of radionuclides from diffuse or fugitive sources at DOE PORTS.

Air monitors are utilized at PORTS to aid in detecting the presence of radiological emissions from diffuse or fugitive sources. The PORTS network consists of 27 ambient air monitors at 15 locations (15 low volume and 12 high volume ambient air monitors). The air monitors are divided into three groups: onsite, property line, and offsite. The monitors are owned and operated by USEC. The filters from both low volume and high volume samplers are analyzed for total alpha and total beta activity; the alpha is assumed to come from uranium and the beta from technetium. Data from both systems indicate that the units are measuring background levels of radiation.

Table 3.0 DOE AIR EMISSIONS DATA								
Point Source	Type Control	Control Efficiency	Distance in meters to the Nearest:					
			Resident	School	Office Business	Farm		
						Vegetation	Meat	Milk
X-345 HASA Manifold Evacuation/Gulper	Cold Traps (Manifold only) Chemical Adsorbents	90-95% 0-95%	1410 ESE	4020 NNW	1560 W	3260 N	1310 ESE	8200 ENE

SECTION III. DOSE ASSESSMENTS

Description of Dose Model

The radiation dose calculations were performed using the CAP-88 package of computer codes. This package contains EPA's most recent version of the AIRDOS-EPA computer code. This program implements a steady-state, Gaussian plume, atmospheric dispersion model to calculate environmental concentrations of released radionuclides. It also includes Regulatory Guide 1.109 food chain models to calculate human exposure, both internal and external, to radionuclides deposited in the environment. The human exposure values are then used by the EPA's latest version of the DARTAB computer code to calculate radiation dose to man from the radionuclides released during the year. The dose calculations use dose conversion factors in the latest version of the RADRISK data file, which is provided by the EPA with the CAP-88 package.

Summary of Input Parameters

Except for the radionuclide parameters given in Section I and those given below, all input parameter values used are the default values provided with the CAP-88 computer codes and data bases. The maximally exposed individual is considered to reside at the plant boundary.

Meteorological data:	1996 data from onsite tower
Rainfall rate:	123.6 cm/year (CY 1996)
Average air temperature:	11.04 °C (CY 1996)
Average mixing layer height:	2000 meters

Fraction of foodstuffs from:	<u>Local Area</u>	<u>Within 50 mi</u>	<u>Beyond 50 mi*</u>
Vegetables and produce	0.700	0.300	0.000
Meat	0.442	0.588	0.000
Milk	0.399	0.601	0.000

* The dose estimate for foodstuffs is very conservative when 0.0 is used as an input parameter in the category of foodstuffs consumed that were produced at a distance of 50 miles or more from the PORTS site. The majority of the foodstuffs consumed are purchased at supermarkets that receive foodstuffs from all over the world.

Compliance Assessment

The CAP-88 model calculated the effective dose equivalent (EDE) for DOE PORTS to be 0.000000262 mrem/yr. In order to determine compliance adequately, the EDE from USEC should be added to this number. The dose contribution as reported by USEC is 0.14 mrem/yr for their operations at PORTS. The total reservation EDE for 1996 was 0.14 mrem/yr. Emissions from DOE sources were insignificant. This dose from PORTS is substantially below the regulatory limit of 10 mrem/yr.

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information for Department of Energy activities, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment (see 18 U.S.C. 1001).

Name : E. W. Gillespie
DOE Site Manager

Signature: Eugene W. Gillespie Date: 6/23/97

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